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WATERFOWL SPECIES MANAGEMENT: PROBLEMS AND PROGRESS[1/]

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INTRODUCTION

Recently, waterfowl biologists and administrators have shown increasing interest in managing waterfowl by individual species. Two major factors seem to be responsible. The first is certainly the restrictive regulations of recent years resulting from drought in important breeding areas. This has caused a search for species or populations units either not affected by the drought or not adequately harvested. The purpose, of course, is to use these species to supply recreation during periods when other birds are in short supply.

The second factor is a growing fund of knowledge concerning population dynamics which demonstrates the need for management by individual species if the waterfowl resource is to supply maximum harvest over a long period of time. These data have shown that some species of waterfowl differ in their characteristics as much as do pheasants and grouse and that management techniques suitable for one species may be unsuitable for another. On occasion, the data have suggested that some species or population segment should be able to sustain additional harvest. At other times the data have demonstrated the need for more protection. It is the purpose of this paper to summarize existing knowledge concerning species management and to use this as a basis for judging the future of this type of management.

Methods

One of the major tools for managing waterfowl by species is shooting regulations. This tool has been used for many years in the form of restrictive or closed seasons for a particular species. It was first employed in Louisiana in 1904 when the season was closed on wood duck. Since that date either closure of season or limitations on length or bag limits have been applied to a variety of species. A recent example was the closure on the redhead and canvasback from 1960 through 1963. Restrictions or closures for a given species also have been employed on a time and area basis. The need for protecting various segments of the Great Basin

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Canada goose population has prompted reduced bag limits, closures, and adjustments of either opening or closing dates in selected areas. Recent regulations delaying the opening of the season on white geese until October 5 in a portion of Saskatchewan constitute another example. By this date, the bulk of the Ross's geese have migrated southward and even though they can now be legally taken, the kill of this species has been materially reduced as compared to kill during seasons which opened in September with a complete closure on Ross's.

Another variation of the use of delayed opening as a species management tool occurred several years ago in Florida (Sincock, 1957). At the time, State personnel were concerned about the status of the local Florida duck population. They ascertained that, with an early opening, shooting pressure was directed mainly on their local birds because the migrants had not yet arrived. Delaying the opening until late November allowed large numbers of northern birds to move in and materially reduced the pressure on the Florida duck.

Not all shooting regulations for managing species have been restrictive. Larger bag limits, longer seasons, or more shooting hours have been established for a variety of reasons and in a number of locations. An over-abundance of birds has prompted progressively more liberal shooting regulations for mallards in the Pacific Northwest in recent years. To control depredation on rice in the Pacific Flyway, bonus bags were established on pintail and baldpate from 1952 through 1958. Longer seasons and larger bag limits also have been established for species that either are not particularly vulnerable to shooting or are not highly prized by hunters. Scoters and mergansers are good examples of this. Over the past several years, scaup bonuses have been established in various ways to increase harvest rates on this lightly shot species. These bonus regulations have been made to include entire flyways or specific areas within flyways. In the eastern Canadian Provinces, extra scaup in the bag have been allowed during the latter part of the season after less numerous species including the canvasback and redhead have migrated southward.

Split seasons have been used to increase harvest rates for an individual species. The selection of seasons last fall by Iowa is a recent example. The State elected to open the season for 2 days on October 3 and 4 to take advantage of the early flight of blue-winged teal and then opened it again on October 24.

Present Status of Knowledge Concerning Species Management

There is much that we know, a little that we suspect, and much that we don't know about managing waterfowl by species. Prior to about 1954,

there is little possibility of evaluating the various shooting regulations established to either protect or exploit individual species. During the past 10 years, a data gathering program of sufficient magnitude has been operating in North America to measure the results of at least a portion of the species management efforts. From the evaluations a degree of understanding has developed. Also, it is now possible to pinpoint gaps in our knowledge and to suggest methods for securing the information.

Restrictive Shooting Regulations:

Although there are still many questions concerning the relationship between shooting regulations and population survival, evidence is accumulating that for many species of migratory game there is a direct relationship between hunting regulations and shooting pressure and, in turn, between shooting pressure and survival. Geis, (1963) gave a paper at the North American Wildlife Conference in which he presented data and discussed the problem. Since then, a rather thorough analysis of black duck banding and population data have been completed and banding data for several other species have been reviewed in a preliminary way. In varying degrees these analyses support the contention that restrictive shooting regulations increase survival and refute the generally accepted principle developed for resident game that "If you don't shoot them they will die anyway."

If waterfowl losses due to natural causes were density dependent, then the fraction lost due to factors other than shooting should have been higher when populations were larger, and lower when they were smaller. Actually, when mallard breeding populations exceeded 10 million birds during the midfifties (Crissey, 1964), the annual loss rate due to natural causes varied between 10 and 20 percent of the population present on September 1. During recent years with populations about half the midfifties level, loss due to factors other than shooting has remained within the same 10 to 20 percent level. In other words, so long as we are dealing with populations no larger than those of the past decade a comparatively small and rather consistent portion of the population has been lost due to natural causes during periods when the population level fluctuated widely.

On the other hand, banding data demonstrate that restrictive shooting regulations have markedly reduced the fraction of the population present that is killed within a given season. During the midfifties with bag limits of four or more and season lengths of 70 to 95 days, first season recovery rates on mallards were much higher than they were with the much more restrictive regulations in 1962 and 1963. For example, winter bandings of mallards in Colorado in 1956 and 1958 had first season recovery rates five times greater than in 1962 when the bag limit was one mallard and only 25 days of shooting were allowed (Grieb, Ballou and Geis, 1964).

Of greater significance are analyses of accumulated data which demonstrate a positive relationship between band recovery rate and mortality. For example, an analysis of black duck banding data just completed (Smith and Geis, 1965) shows that populations with 15 percent recovery rates had annual mortality averaging 71 percent with 44 percent of the annual loss being due to hunting mortality and 27 percent to other causes. In contrast, populations with 5 percent recovery rates had a total mortality rate of 49 percent with 13 percent due to hunting and 36 percent due to other causes. Thus, both total and hunting mortality were affected greatly by changes in shooting pressure, while mortality due to natural causes varied only 9 percentage points.

Perhaps a way to illustrate some of the principles is to ask ourselves the question what would happen to the mallard population if we did not hunt for a period of years. Sufficient clues from data collected in the past at least permit reasonable suppositions as to what might happen. First, the data demonstrate that at population levels of recent years, and measured from the time the birds are old enough to fly, losses due to causes other than shooting have averaged less than 20 percent annually. Second, since the early fifties, the production ratio in the mallard population has ranged from a peak of about 2 young per adult to a low of 0.5 young per adult. This variation in production was caused by fluctuating pothole breeding habitat which, in turn, resulted from variations in rainfall. If hunting were to cease for several years, it seems likely that at first production would exceed mortality and the population would increase rapidly, particularly if pothole habitat was well watered at the time. As the population increases, it seems logical that the more crowded conditions along the migration routes and on the wintering grounds might increase the mortality rate. However, the small changes in rates of loss due to causes other than shooting that have been associated with rather large changes in the size of the breeding population in recent years make it hard to believe that the loss rate would increase very much. On the other hand, the wide range in production ratios that have been experienced and their obvious relation to amount of breeding habitat suggests that the mallard population would rapidly expand to the extent of its breeding habitat. As the population continued to increase, greater and greater proportions of the population would be unable to find suitable breeding areas. Accordingly, we would forecast that after a relatively few years, the mallard population would increase from two to four times its present size. At this level, it would exceed the capacity of its breeding range to the extent that the average production ratio would be about .25 young per adult. This ratio would approximately balance the mortality rate, and the population would become stable.

For a few other species, we know that rate of loss due to natural causes exceeds that of mallards. For example, the annual loss of black ducks due to causes other than shooting averages about 30 percent during their first year and about 18 percent thereafter (op. cit.). For blue-winged teal it is even higher. At present, we do not know whether a

lower population of either black duck or blue-winged teal would result in a lesser mortality from natural causes. However, black duck populations have fluctuated considerably during recent years. An analysis of the banding data suggests that the proportion of these birds lost to natural causes during periods of high populations has been no different than that when the population was lower. This leads to the conclusion that natural mortality among black ducks is not density dependent at population levels experienced in recent years. That is, a more or less constant fraction of the population dies due to natural causes regardless of population size. This single factor causes restrictive regulations to be potent management tools, because kill is largely additive to other mortality, and a large proportion of birds that are not killed will survive.

Liberal Shooting Regulations:

What about the value of more liberal shooting regulations as species management tools? In this general area we run out of answers rather quickly, primarily because we lack knowledge concerning factors currently limiting the populations of lightly harvested species.

For example, if we increase the harvest of blue-winged teal and the population is not reduced, one or both of two things must happen. Either a decreased natural mortality rate must compensate for the additional harvest, or a decrease in breeding population will result in a higher rate of production then would otherwise occur. Actually, we have little information bearing on either situation. It is at least possible that the rate at which blue-winged teal are lost due to natural causes during the migration and wintering periods is independent of density. Blue-winged teal, which winter mostly in Columbia and Venezuela, make the longest fall and spring migration of any North American waterfowl. It is conceivable that loss during this long migration is a more or less constant percent of the number of birds making the flight. If this should prove to be true, then additional harvest will simply add to the total mortality. This hypothesis is substantiated to some extent by breeding population aerial survey indices from 1959 to 1962. Due to drought in key breeding areas, the index decreased 48 percent in 3 years. However, if a lesser density of blue wings had been associated with higher survival, then the population should not have decreased as sharply as it did.

In blue-winged teal breeding areas, it is possible that lower populations have reproduced at a higher rate than would have been the case had the breeding population density been greater. However, if this has been so, it has been completely obscured by very large fluctuations in the amount of habitat available to the birds. The blue-winged teal is a prairie pothole nester and, because of drought conditions, the amount of this habitat has varied during the past decade from more than 5 million potholes in July of 1956 to less than one-half million in July of 1962.

It is obvious that during the drought period, at least, there have been many more blue-winged teal in the breeding population than could find suitable places to nest. This has been demonstrated by sharp reductions in the ratio of young to adult birds in kill by hunters as measured by the Duck Wing Collection Survey.

The important point is that we do not know what will happen if the harvest rate of blue-winged teal is increased, and there is no means of evaluating past data to determine the answer. The only way to find out is to experiment. On January 15, the Department of Interior announced that a special 9-day teal season would be allowed in the fall of 1965 in Central and Mississippi Flyway States between the dates of September 1 and 30. Provisions which have been made for evaluating the results include measurement of the effect of additional kill on blue-winged teal populations as well as a determination of the ability of hunters to refrain from shooting species other than teal during the special season.

Information presently available suggests that waterfowl species may be quite unequal in their ability to withstand kill by hunters. Of major importance are variations in average production ratios. To illustrate the principle by exaggerating the example, it is quite obvious that mallards which breed when 11 months old and lay 10 eggs are potentially capable of withstanding a higher portion of their fall population being harvested than are swans which do not breed until they are 3 years or older and lay only 4 - 5 eggs. These differences in production potential are balanced by corresponding differences in rates of loss. Within these variations of production and mortality, and depending on the causative factors, some species can withstand high harvest rates without decrease while others cannot.

I hasten to add that present regulations probably do not provide for the greatest possible harvest of each waterfowl species on a sustained yield basis. A combination of banding, population, kill survey, and age ratio data suggests that certain species or population segments may be able to supply additional harvest. Lesser scaup may be an example. Quite recently, a rather startling bit of information has turned up which suggests that production ratio for lesser scaup may be very low. Specifically, age ratios in the kill as determined by the wing collection survey have been about average in comparison to other species during the past 3 years. However, based on bandings of young birds and adults in Alaska during the same period, it appears that a much higher proportion of the young birds are shot than adults. When this differential in vulnerability to shooting is applied to the age ratios observed in birds killed, the corrected age ratio in the scaup population during the last 3 years has been very low indeed, perhaps no more than 0.3 to 0.4 immatures per adult as an average. Since there is no evidence that the scaup population decreased during this period of low production, mortality

The lesser scaup is primarily a northern nester. Northern habitat is not plagued by long periods of drought, as is prairie pothole habitat, and the quanity available each year is more or less constant. Although northern habitat seems to be present in vast quantities, the truly productive portion of northern habitat, mainly river deltas and river flats that are periodically flooded by silt-laden water, are surprisingly restricted in area. It may be that these habitats are overstocked with scaup. This is one situation in which a reduction in density of breeding population may result in a higher rate of production. Attempts have been made to increase scaup harvest by means of bonus bag regulations, but so far they have not been particularly effective. If it does prove feasible to increase scaup harvest rates, and if the size of the breeding population is decreased as a result, it should be possible with our present data collecting programs to determine if this reduction in breeding population is compensated for by an increase in average production ratio. I wish to emphasize "average" when speaking of a production ratio associated with a species that breeds primarily in the North, because weather conditions are such that wide fluctuations in breeding success occur from year to year. The major difference between prairie and northern breeding habitat seems to be that northern habitat is not subject to sweeping trends in conditions with several years of abundant habitat being followed by several years with reduced amounts of poor quality habitat. Rather, a "bust" year due to severe weather conditions can be followed the next year by favorable conditions and peak production. For these reasons, it is concluded that the problem of managing northern breeding species may be fundamentally different than managing species that breed primarily in prairie areas subject to wet and dry cycles. As with blue-winged teal, the only way to find out what will happe[illegible] scaup harvest rates are increased is to experiment.

Mallards - Pacific Northwest:

No discussion of species management would be complete without mentioning the mallard situation in the Pacific Northwest. In the Columbia Basin in Washington, Oregon, and Idaho, and primarily due to development of large irrigation projects, a situation attractive to mallards has developed in recent years. The habitat is a combination of reservoirs and harvested grain fields. The birds develop habits of resting on the reservoirs during the day and feeding in the fields at night. As a result, they have a low vulnerability to shooting. Also, the quality of the habitat is such that loss due to causes other than shooting is low, particularly during mild winters such as have existed during recent years. With l[illegible] rates of loss, the Columbia Basin mallard population has increased in recent years in spite of below average production ratios due to drought in important breeding areas. According to the annual winter survey, the population increased from an average of about 400,000 prior to 1956, to about 1 3/4 million in the last 4 years. This increase was recognized by establishing bonus bag [illegible]

in 1961. Since then, the shooting regulations for mallards in the Columbia Basin have been further liberalized with the 1964 regulations allowing a daily bag of 8 with a possession limit of 16 (of which 4 and 8, respectively, must be mallards); extension of the season to a maximum length of 107 days; and an extension of shooting hours to 1/2 hour after sunset. So far, these liberalizations have failed to increase the harvest rate materially. It may be that a considerable departure from standard hunting methods will be required if this is to be accomplished.

You may ask why is it necessary to increase the harvest rate on this population of birds. The answer has several ramifications. First, it seems likely that as long as production exceeds mortality the population will continue to increase. Even at the level which exists today, waterfowl administrators in the State of Washington have warned that serious winter losses can be expected if a severe winter is experienced. If we accept the fact that the present size of the population is adequate, then the problem is one of increasing mortality rates so as to bring them into balance with production. For many reasons, it seems advisable to increase mortality by means of additional harvest rather than to allow occasionally severe winter weather to accomplish this loss.

Also, there is a suggestion in the banding data that the large wintering population of mallards in the Columbia Basin, which now comprises nearly one-fifth of the continental total, is related to the number of birds available to hunters in the Central and Mississippi Flyways. A preliminary analysis of the data suggests three things. First, once a bird has selected its migration route and wintering area, there will be few changes during the remainder of its life. We conclude, therefore, that there has been no shift to the Pacific Flyway of birds that have migrated once or more to either the Central or Mississippi Flyways. Second, recoveries of birds banded in the Columbia Basin during the winter suggest that southern Alberta is a primary breeding area. Third, banding of young mallards in southern Alberta, both before and after the build-up in the Columbia Basin occurred, suggests that a slightly higher portion of young from southern Alberta are now being harvested in the Central and Mississippi Flyways than before the build-up. This may seem contrary to expectations. However, you must remember that a band recovered represents a bird killed and does not necessarily represent comparative distribution of birds to the place of harvest. In the Columbia Basin, there has been a very large increase in number of birds present with only a small increase in the number killed. Therefore, the kill during the last few years has represented a smaller fraction of the birds present than before the build-up in population occurred, and this is true for banded birds as well as unbanded. In contrast, harvest rates of mallards going to the Central and Mississippi Flyways have remained comparatively high. Therefore, even though the distribution of young birds from southern Alberta to the three flyways may not have changed—the distribution of band recoveries shows a somewhat lesser portion now being taken in the Pacific Flyway due to a decrease in the proportion harvested.

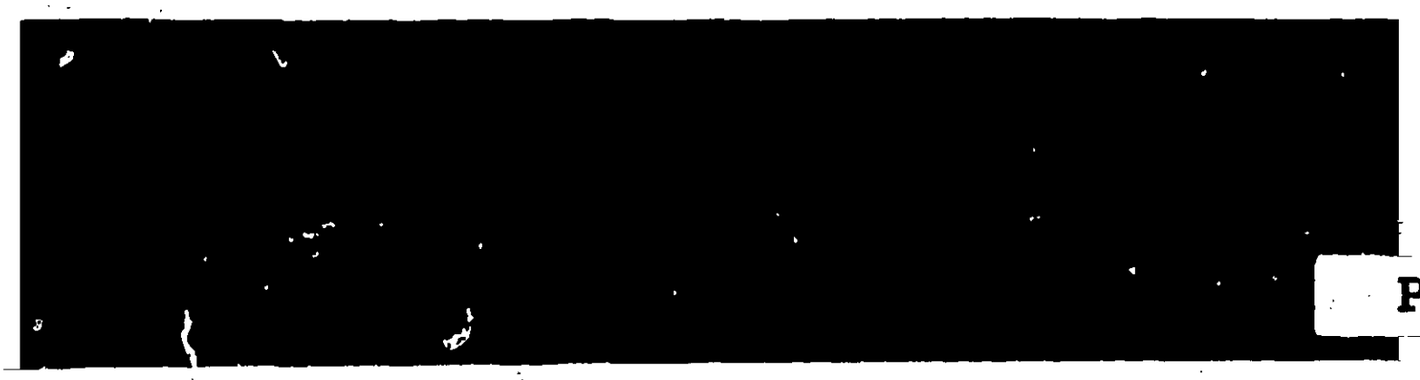
Although the distribution of young mallards from the primary breeding areas may have remained the same, there is reason to believe that the distribution of adults may be different. The reasons are these: First, the Mississippi and Central Flyways and the Columbia Basin have many breeding areas in common. Second, during the period when the mallard wintering population in the Columbia Basin was increasing, the populations in the Mississippi and Central Flyways were decreasing. Since these changes cannot be accounted for by differences in rates of production associated with the three areas, then the rate of survival must have been higher for the Columbia Basin birds than for those in the two Flyways. Third, when several wintering areas are associated with a given breeding area, like southern Alberta, and when one of the wintering areas, such as the Columbia Basin, enjoys a higher survival rate than the others, then adult birds with a tradition of returning to the wintering area with higher survival will gradually increase. Thus, it seems likely that a higher portion of the adults in several of the major breeding areas supplying the Mississippi and Central Flyways are now oriented to the Columbia Basin than before the build-up occurred. Since an average fall flight is made up of nearly as many adults as young in an average year, present flights of adults to the Mississippi and Central Flyways must be somewhat smaller than they would be if the Columbia Basin concentration did not exist. On the other hand, mallards in the Columbia Basin seem to constitute a reservoir of breeders which supply young to the Central and Mississippi Flyways. The degree to which less adults in the fall flights to the two Flyways is compensated for by more young is not known.

Duck Production - Dakotas and Western Minnesota:

In contrast to the situation in the Columbia Basin where for mallards the average production ratio in recent years has exceeded mortality, there is a strong suggestion that the reverse has been true in the Dakotas and western Minnesota. In this instance, a breeding population is involved and the implications are more serious.

Hochbaum (1947) presented a paper at the North American Wildlife Conference in which he proposed that duck production in important breeding areas was being reduced by "burning out" the breeding population with overshooting. Recent data substantiate his earlier findings and since species are effected differently by the factors involved, the problem is worthy of discussion in this paper.

First, during the past 10 years the most numerous breeding duck in the southern portions of the Prairie Provinces has been the mallard, averaging 30 percent of the total, while blue-winged teal made up about 18 percent. In the Dakotas and western Minnesota, the situation has been approximately reversed with blue-winged teal making up 30 percent and mallard only 16 percent. Why the difference? One piece of information related to the problem is the early-date migration



wing which allows it to escape much of the heavy shooting pressure to which late migrating species are exposed. As a result, band recovery rates for blue wings are low from most breeding areas averaging less than 3 percent. In contrast, band recovery rates for mallards are much higher. However, except for periods when shooting regulations in the Central and Mississippi Flyways have been very restrictive, the recovery rate for mallards banded in the Dakotas and western Minnesota has been approximately twice as great as for mallards banded in the southern portions of the Prairie Provinces (Lensink, 1964).

Soulé (1955) and many others have determined that ducks have a strong homing tendency to natal marshes. An explanation of the difference in breeding population species composition between the Prairie Provinces and the Dakotas and western Minnesota is simply that excessive shooting of late migrating mallards in the stateside portion of the pothole breeding range has resulted in mortality in excess of production. As a result, mallards homing to breeding areas in the Dakotas and Minnesota have been materially reduced in number, while their Canadian counterparts have survived. On the other hand, due to early fall migration, neither the United States nor the Canadian blue wings have been materially effected by shooting and have survived to home to their respective breeding areas. Thus, what we might look on as a normal species composition in pothole breeding habitat with mallard as the dominant species has been upset in the Dakotas and Minnesota where the mallard and other late migrating species have suffered a mortality rate they could not overcome.

The idea that overharvest of late migrating mallards accounts for the difference in species composition between Canadian and United States pothole breeding range is supported by observations made in the vicinity of Minneapolis and St. Paul. Due to urban development, a two-county area in the vicinity of these cities is closed to hunting. Within the area, there is a good scattering of potholes and small marshy lakes. Casual observation demonstrates that mallard is the dominant nester in the two counties. This suggests that closure to shooting has provided sufficient protection that production has balanced mortality and a "homing" population of mallards has been maintained.

Finally, a summary by Arthur Hawkins (memorandum, 1963) of all available data from intensive studies conducted in pothole breeding range during the past decade reveals that acre for acre of wetland habitat, Canadian potholes produce ducklings at about four times the rate of United States potholes. Actually, if you accept the explanation concerning the difference in species composition between the two portions of the pothole breeding range, then a lesser rate of production would be expected in the Dakotas and western Minnesota, and for the same reasons. In any area where average mortality exceeds average production instinct to the area will be reduced. This means that to a larger and

larger extent the breeding population in a given year must be made up of birds basically enroute to another breeding area (in this case probably in Canada). Since the homing instinct is rather strong, any area that depends on attracting birds enroute elsewhere to make up a significant part of its breeding population will likely end up with a low density breeding population and low production. The difference of four to one in comparative production between Canadian and United States pothole habitat may be an exaggeration due to poor distribution of intensive study areas on both sides of the border. Nevertheless, there is a strong suggestion that overshooting of the indigenous breeding population is a potent factor affecting the amount of production per unit of habitat over broad areas.

You are all aware of the loss of critical duck breeding habitat and the problems this poses. To mitigate these losses to the greatest extent possible, Research has been assigned the responsibility of finding means of making "two ducks grow where one grew before." To accomplish this, many people are thinking in terms of new techniques for managing habitat. However, I believe that these techniques can have little beneficial effect unless within the general area where they are applied, the harvest rate can be held down to the point where survival of the local population can equal or exceed mortality. In the Dakotas and western Minnesota, it may be entirely feasible to materially increase production per unit of habitat by restrictive regulations within this area for a brief period of years. These restrictions might take the form of delaying the opening of the season until the local population has been diluted with migrant birds from further north. It should be noted, however, that in Wisconsin, Jahn and Hunt (1964) found that opening dates varying between October 1 and October 15 did not seem to effect the size of their breeding population, except possibly for wood duck. It may be that some other solution than delaying the opening date will be required. Regardless of the technique used, it will be gratifying indeed if the production of an important species like the mallard can be materially increased in a broad area with no more expense than is required to establish shooting regulations designed to protect the local breeding stock for a period of 3 or 4 years.

The Columbia Basin and the Dakotas-western Minnesota mallard problems have been discussed in some detail, because they illustrate types of situations which undoubtedly exist in other areas and within the populations of other species. They illustrate the need for detailed information concerning distribution during the breeding, migration, and wintering periods; for banding data so that mortality, including the portion due to shooting, can be determined for individual segments of the population; and the need for production rate (age ratio) information that can be related to each of these populations. Special management has many ramifications and can pay big dividends.

Species Identification by Hunters:

Another general field related to species management in which information is beginning to accumulate is the ability of hunters to identify waterfowl. It was discovered during the early days of the Waterfowl Kill Survey that if hunters were asked to supply information concerning the species of birds they killed, that a summation of their answers would agree surprisingly well with the actual species composition of the birds bagged. There were certain relatively minor but quite consistent differences. For example, the mallard was regularly over-reported, while some of the less numerous and less spectacularly marked birds, such as the gadwall and widgeon were regularly under-reported (Geis and Carney, 1961) and (John and Hunt, op. cit.). However, more intensive studies of the ability of hunters to identify birds have not been so encouraging. For example, Forest Lee (1956) conducted a study among 595 hunters in Minnesota in 1955 to determine their ability to identify the ducks they bagged. Approximately one-third of the total birds were misidentified with most hunters properly identifying such species as mallard, blue-winged teal, and lesser scaup, but less than half knowing such species as ringneck, baldpate, and gadwall. The fact that 64 percent of the hunters identified ringnecks as scaup combined with the fact that ringneck are more vulnerable to shooting than scaup as evidenced by much higher band recovery rates materially reduces the feasibility of bonus scaup regulations in many localities.

In some locations, it is quite obvious that hunters are able to identify species, or at least the species of major interest. For example, the majority of canvasback hunters around Chesapeake Bay are able to separate canvasbacks from other species and seldom kill anything else. Similarly, hunters along the gulf coast of Texas are able to identify and shoot mainly redheads. In both areas, restrictions in bag and then closure of the season on canvasbacks and redheads caused large numbers of hunters to cease hunting in spite of the fact that good populations of scaup were still available. Members of many clubs pride themselves in their ability to identify species. Penalties are sometimes assessed against members who shoot anything except drake mallards or perhaps bull sprig.

Additional data on ability to identify species comes from individuals who volunteer the identity of the bird as they report a band. Generally speaking, birds that are important in the bag within a given region are more frequently identified than are uncommon birds. To illustrate, in Wisconsin where the ringneck is not particularly important in the bag, 14 of 20 hunters reporting banded ringnecks called their birds scaup or bluebill and only 5 identified their birds as ringneck or ringbill (John and Hunt, op. cit.). On the other hand, this species is important in portions of Louisiana and Florida and most of the banded ringnecks turned in from this area are correctly named.

Nevertheless, we must conclude that the ability of most United States hunters to identify waterfowl with the birds in hand is not good at the present time and is very poor when the birds are viewed in flight. If species management is to work in many situations, the birds must be identified in the air before the gun is fired. It does little good to discover a mistake after the bird is already dead. The fact that hunters in some localities have developed the ability to identify key species on the wing demonstrates that it is feasible.

Species Management in the Future

As human populations increase, the need for making more efficient use of all resources that supply recreation also will increase. Efficient use of the waterfowl resource for this purpose will necessitate refinement or development of a variety of techniques that can be lumped under the general heading of species management. Accomplishing this will demand considerable expansion in our knowledge about population dynamics, not only of each species but of population segments within species. Many of our current data collecting programs are aimed more toward continental or total flyway populations than toward specific segments within flyways. Also, our programs sometimes unintentionally emphasize major species, or at least those species about which information can be easily obtained. This is particularly true with banding because some species are much more easily trapped than others. Before species management can become more efficient, a considerable expansion will be needed in data collection programs with special emphasis given to several of the species that present difficult problems.

A major factor which will determine how far we can go with species management in the future will be ability of hunters to identify species before they shoot. Looking several generations in the future, there is a chance that efforts of people interested in waterfowl will be less successful in preventing inroads into critical breeding habitat. Populations of many important species may decrease, while pressure for recreational uses of waterfowl increase. Under such circumstances we can, perhaps, take a page from the history of hunting in Europe as a guideline. In many areas where game has become relatively scarce, hunting has taken on a ritualistic aspect where as much or more recreation is obtained from the rituals involved than is provided by the kills that are made. Perhaps this is going too far, but I can visualize a situation where the right to participate in hunting waterfowl will depend on the ability of the individual to identify species and where there might be as much recreation provided by learning to properly identify the birds as there is in the actual shooting that follows.

In the meantime, there are many refinements in species management that are not dependent on hunters being able to identify species before

they shoot. For example, data now available show that populations of some species are present in places and/or at times when they are not mixed to a significant degree with other species with which they might be confused. This is true for scaup in portions of the Atlantic Flyway. However, the Atlantic Flyway Council has gone on record favoring only those species regulations which can be applied flyway-wide. This materially reduces the possibilities for several types of species management practices in this Flyway and demonstrates that management by species involves people as well as the birds themselves.

In summary, we are dealing with individual species to a considerable extent at the present time in managing the waterfowl resource. As information accumulates to point the way, we will do more species management in the future. A stumbling block is lack of ability on the part of hunters to identify birds on the wing. Also, knowledge is lacking concerning the degree to which each of the apparently under-utilized species can provide additional harvest on a sustained yield basis. In many instances, there seems no way to increase our knowledge except to establish experimental seasons, and then evaluate the results. Fortunately, our data collecting programs have progressed to the point where we are able for most of the important species to measure mortality due to hunting, total annual loss, and the production ratio associated with various units of the population. We are now in a position to gather knowledge for refining species management practices. One word of caution, when an experiment is conducted, it may not necessarily result in an answer that demonstrates the feasibility of harvesting greater numbers of a certain species. Some people seem to have concluded already that blue-winged teal can withstand additional harvest, and they are looking on the proposed teal season next September as proper management and not as an experiment. We do not now know what the outcome will be. Everyone's understanding and cooperation is needed if rapid progress is to be made.

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